

CLAIMS:

1. An encoder for encoding audio signals, the encoder comprising
means (1) for generating a monaural signal (MAS) comprising a combination
of at least two input audio signals ($x(n)$, $y(n)$), and
means (10) for generating a set of spatial parameters (IPDi; ICi) indicative of
5 spatial properties of the at least two input audio signals ($x(n)$, $y(n)$), wherein the set of spatial
parameters (IPDi; ICi) at least comprises an inter-channel coherence value (ICi) and/or an
inter-channel phase difference value (IPDi), and wherein the means (10) for generating the
set of spatial parameters (IPDi; ICi) comprises
means (106; 106, 107) for generating a cross-correlation function (R_i ; P_i) of
10 the at least two input audio signals ($x(n)$, $y(n)$),
means (111) for determining a complex coherence value (Q_i) by summing
values of the cross-correlation function (R_i ; P_i), and
means (112) for determining an absolute value of the complex coherence value
(Q_i) to obtain an estimate of the inter-channel coherence value (ICi), and/or
15 means (113) for determining an argument of the complex coherence value (Q_i)
to obtain an estimate of the inter-channel phase difference value (IPDi).
2. An encoder for encoding audio signals as claimed in claim 1, wherein the
means (10) for generating the set of spatial parameters (IPDi; ICi) comprises means (102,
20 103) for transforming the input audio signals ($x(n)$, $y(n)$) into a frequency or sub-band
domain to obtain audio signals in the frequency or sub-band domain ($X(k)$, $Y(k)$), and
wherein the means (106; 106, 107) for generating the cross-correlation function (R_i ; P_i) are
arranged for calculating a complex cross-correlation function (R_i ; P_i) as a multiplication of
one of the audio signals in the frequency or sub-band domain ($X(k)$, $Y(k)$) and the complex
25 conjugated other one of the audio signals in the frequency or sub-band domain ($X(k)$, $Y(k)$).
3. An encoder for encoding audio signals as claimed in claim 2, wherein the
means (106; 106, 107) for generating the cross-correlation function (R_i ; P_i) are arranged for
calculating a corrected cross-correlation function (R'_i) being the cross-correlation function

(R_i) wherein its argument (ARG) is replaced by a derivative (DA) of said argument (ARG), and wherein the means (111) for determining the complex coherence value (Q_i) is arranged for summing the values of the corrected cross-correlation function (R'_i).

- 5 4. An encoder for encoding audio signals as claimed in claim 1, wherein the means (10) for generating the set of spatial parameters (IPD_i ; IC_i) comprises means (102, 103) for transforming the input audio signals ($x(n)$, $y(n)$) into a frequency domain to obtain audio signals in the frequency domain ($X(k)$, $Y(k)$), and means (104, 105) for dividing the audio signals in the frequency domain ($X(k)$, $Y(k)$) into corresponding pluralities of sub-band
10 signals ($X_i(k)$, $Y_i(k)$) associated with frequency sub-bands (i), and wherein
the means (106; 106, 107) for generating the cross-correlation function (R_i ; P_i)
is arranged for determining the cross-correlation function (R_i ; P_i) from the sub-band signals ($X_i(k)$, $Y_i(k)$) for at least each one of the frequency sub-bands (i) belonging to a subset of the frequency sub-bands (i),
15 the means (111) for determining the complex coherence value (Q_i) is arranged for summing the values of the cross-correlation function (R_i ; P_i) in at least each one of the frequency sub-bands (i) belonging to the subset, and
the means (112) for determining the absolute value of the complex coherence value (Q_i) is arranged for obtaining the estimate of the coherence value (IC_i) for at least each
20 one of the frequency sub-bands (i) of the subset, and/or
the means (113) for determining the argument of the complex coherence value (Q_i) is arranged for obtaining the inter-channel phase difference value (IPD_i) for at least each one of the frequency sub-bands (i) of the subset.
- 25 5. An encoder for encoding audio signals as claimed in claim 4, wherein the means (106; 106, 107) for generating the cross-correlation function (R_i ; P_i) are arranged for calculating:
for frequency sub-bands (i) below a predetermined frequency, the cross-correlation functions (R_i ; P_i) as a multiplication of one of the sub-band signals ($X_i(k)$, $Y_i(k)$)
30 and the complex conjugated other one of the sub-band signals ($X_i(k)$, $Y_i(k)$), wherein the means (111) for determining the complex coherence value (Q_i) is arranged for summing the values of the cross-correlation function (R_i ; P_i) in at least each one of the frequency sub-bands (i) of the subset, and

for frequency sub-bands (i) above the predetermined frequency, corrected cross-correlation functions ($R'i$) being the cross-correlation function (R_i) wherein its argument (ARG) is replaced by a derivative (DA) of said argument (ARG), and wherein the means (111) for determining the complex coherence value (Q_i) is arranged for summing the values of the corrected cross-correlation function ($R'i$) in at least each one of the frequency sub-bands (i) of the subset.

6. A method of encoding audio signals, the method comprising
- generating (1) a monaural signal (MAS) comprising a combination of at least two input audio signals ($x(n)$, $y(n)$), and
- generating (10) a set of spatial parameters (IPD_i ; IC_i) indicative of spatial properties of the at least two input audio signals ($x(n)$, $y(n)$), wherein the set of spatial parameters (IPD_i ; IC_i) at least comprises an inter-channel coherence value (IC_i) and/or an inter-channel phase difference value (IPD_i), and wherein the step of generating (10) the set of spatial parameters (IPD ; IC) comprises
- generating (106; 106, 107) a cross-correlation function (R_i ; P_i) of the at least two input audio signals ($x(n)$, $y(n)$) in a frequency domain,
- determining (111) a complex coherence value (Q_i) by summing values of the cross-correlation function (R_i ; P_i), and
- determining (112) an absolute value of the complex coherence value (Q_i) to obtain an estimate of the inter-channel coherence value (IC_i), and/or
- determining (113) an argument of the complex coherence value (Q_i) to obtain an estimate of the inter-channel phase difference value (IPD_i).